

REMEDIAL PROJECT MANAGERS' MEETING NOTES
NASA/JET PROPULSION LABORATORY
Room 180-801, 1 February 1995

Attendees:

Organizations represented at the Remedial Project Managers' (RPMs) Meeting included the following:

- ♦ U.S. Environmental Protection Agency (EPA)/Federal Enforcement Branch, Region 9, San Francisco, CA
- ♦ California EPA/Department of Toxic Substances Control (DTSC), Region 3
- ♦ Los Angeles Area California Regional Water Quality Control Board (RWQCB)
- ♦ EBASCO Environmental, Contractor to JPL
- ♦ JPL
- ♦ NASA

A list of individuals attending this RPM meeting is attached to these minutes.

Objectives

The purpose of the NASA/Jet Propulsion Laboratory meeting held on February 1, 1995 at the Jet Propulsion Laboratory in Pasadena, California, was to discuss the following topics:

1. Status of Work Associated With Field Sampling and Analysis Plan for OU-1
2. Results of First Round of Soil Vapor Sampling Performed Under Field Sampling and Analysis Plan for OU-2
3. Status of Work Associated With Field Sampling and Analysis Plan for OU-3
4. Eco-Tox Study
5. DTSC Letter Concerning Arroyo Seco Investigation
6. Schedule for Next RPM Meeting
7. Status of Previous Meeting Action Items
8. Other Topics

Approval of Minutes

1. Status of Work Associated With Field Sampling and Analysis Plan for OU-1

Robles: February 1st 1995. RPM meeting for the NASA/JPL-Pasadena location is called to order. It is approximately 15 after 10, and we want to start off with the status of work associated with field sampling for OU-1.

Buril: Since November we have completed the second round of sampling, and we have also had the analyses come back from the laboratory. They are in the validation process right now. The validation process is almost complete for the first round. We are in the validation summarization portion.

We're finding in the June/July round that the areas around Monitoring Wells (MW) 7, 16, 13, and 8 as being the most highly contaminated. The November sampling bore that out again.

We found only very minor amounts of contamination, if we found anything, in wells along the eastern part of the Lab and, on the western side, very minor amounts as well. I will point out that in the November sampling we had chromium show up in MW-6, but the chromium disappeared completely when the sample was filtered. We think there may be some form of geochemical reaction. It may have been turbidity, it may be well casing corrosion, but it did not appear to be from dissolved chromium. An interesting point too is that in the November-December time frame, MW-14, the first screen, which is not very far away laterally and maybe 20-30 feet deeper than what MW-6 would be sampling, showed no chrome at all. The worst well, MW-7, was up in the neighborhood of 35 ppb TCE, and carbon tetrachloride was 200 ppb. The perchloroethylene concentrations were actually very low all the way through. We did not see much perchlorethylene anywhere on the Laboratory.

On the outer wells, outer meaning along the eastern edge of the arroyo, we had one to two ppb. There was very little if anything present. Well 6, aside from the chromium that was filtered out during the analytical process, and Well 14 showed very little contamination.

We did see some anomalously moderate readings at the end of MW 10. We did get some 24 parts per billion TCE in June-July, 14 in November-December.

Now one of the things that we've also been able to do is to look at general water chemistry itself. This actually proved to be fairly revealing in so much as we identified three fairly distinct water types in the immediate area at JPL: One to the west; one on the east (these are relatively close to the surface); and an overall water type which is much deeper than the preceding two. This is interesting from the stand point of trying to understand the hydrogeology of the area.

It appears that as the two surface types of water meet we do get some kind of mixing in the area of the Laboratory. In fact,

it looks to be principally in the area bounded by the Lab. This follows in large part what we discussed with you last time. That was that we appeared to be in an area where there was very little flow on the Laboratory itself as a result of having these two bodies merge and that the water table across the Laboratory was very flat and didn't appear to be going anywhere. Now one of the things that struck us in looking at this was trying to understand what was going on with Well 10. Well 5 and Well 4 had relatively little, if anything, present in terms of contamination. The greatest number we had was 7.9 parts per billion of TCE in the second screen of Well 4. Well 5 came up totally clean. When you look at that, you start to wonder where that stuff coming from? So in trying to understand this, we began looking at a little more regional picture.

It appears that the water we're getting from the west is flowing across the southern portion of the Lab. The water coming from the Arroyo spreading, and so forth, is here pushing back by flowing to the east. You get flattening of the water table, which is what we've seen in the water table measures when these two merge. The only thing that we were able to come up with is that if we have a gradient coming in from the west that perhaps there's something coming in from the off site, brushing the area around MW 10.

Bishop: When you say relatively flat, is the gradient on the east essentially the same way as the western wells? You say relatively flat. There is nothing between east and west to show high concentrations.

Buril: Well, the only thing we were able to discern was that if we were looking at a situation that would make a southerly flow this way, we would see water tables different than what we are seeing at Well 10. There doesn't appear to be a southerly flow component coming out of this area.

Now one of the reasons that I bring up the idea of something possibly coming out of the northwest is a local water purveyor's problem. This is the Valley Water Service Company Well. They have a perchloroethylene problem and it's one that's been pervasive for a number of years now with some TCE. Their concentrations are cyclic according to seasons. In the winter, they go up; in summer they go down. Right now, they're averaging about 150 to 200 parts per billion. It's interesting to contrast that to what we're seeing on the Laboratory, which is one to two parts per billion.

Melchior: One of the other things that is concerning to us is the large presence of carbon tetrachloride on the Lab, yet absence of carbon tet in Wells 14 and 10.

One of the things is we have very limited data on the Valley Water Company. What we have, we don't have a historical record of the VOC concentrations.

So even though there is a greater preponderance of PERC in that well, we simply don't know what that well was producing 5 years ago or 3 years ago, so the chemistry may have been

completely different 3-5 years ago. It could have been more TCE than PERC. It may have been the same; we just don't know.

Swarthout: I was just trying to figure out if there was anything about a vertical component of contamination - I'm just trying to see if the data is all the same.

Buril: Now to give you an idea, MW-11 is a multiport well, and I'll pass along some of the information on that. The top screen, which is 140-150 feet below grade, is twenty-some odd feet below the water table approximately.

It varies, but it showed 0.6 ppb carbon tetrachloride and 0.6 ppb of TCE, and in a lower screen (second screen) we still had 0.6 ppb of carbon tetrachloride. In the third screen we had some interesting things that I think was a laboratory manifestation. We had carbon disulfide, which doesn't make any sense at all because we never saw it any place else. And the remaining screens are clean

Swarthout: And the Wells, 16, 7, 13, and 8, what is the concentration of carbon tet in those wells?

Buril: I'll give you the latest, November 7. MW-7 was 310 with a duplicate of 280. In Well 8, it was 5.3. In Well 13 for December was 70. Well 16 was 200 for carbon tet. TCE for Well 7 in December was 30, for Well 8 was 3.5, for Well 13 was 70, Well 16 was 30.

None of these numbers have been validated yet, so these are raw data.

Swarthout: So, MW-8 has both carbon tet and TCE at low levels?

Buril: Low levels.

Swarthout: That looks like 7 and 16. And why were the wells at 16 and 7 placed there?

Buril: Seven was placed there long ago. It was one of the original wells for the ESI work that was done back in the late eighties or early nineties. Well 16 was placed because of WP-3, which is identified in the OU-2 FSAP and the Workplan.

The Workplan identified an area as being bulldozed and allegedly used for dumping of solvents.

Well 13 was placed to see if there was something emanating from Building 67 pits, making the assumption that the predominant flow is in the regional direction.

Bishop: Well, obviously something is dumped there near well MW-16. There is contamination there obviously coming from that area.

The only thing I see is that big hole between 10 and the other four wells.

Buril: In trying to understand what's happened here, I look to Wells 4 and 5. We don't see the same concentrations in those. If we had a significant flow of contaminants coming down from that area we'd expect to see more TCE, and I would also expect to see carbon tet molecules.

Robles: So it indicates, or appears to indicate, what we're dealing with here is that the plume is coming out of La Cañada-Flintridge,

Buril: Possibly, we don't know for sure.

Swarthout: What about Wells 6 and 14? How are they?

Buril: Six and fourteen were essentially clean.

Swarthout: So if there's a plume coming out of there, why would they be clean?

Buril: It's just being missed. We're right on the periphery of it at Well 10, perhaps. That's one of the things that we're trying to understand.

Bishop: I assume you've been gauging these wells more or less.

Buril: We have water monitor levels in all of the stand pipe wells. Some of those are out of service right now due to...

We were looking for the kinds of things that would allow us to recognize trends in the way that the water was moving and recognizing what happens when the pumps kick on in the municipal wells.

Swarthout: And the city of Pasadena wells, they're on the east side of the parking lot?

Buril: Correct, they're on the east side of that diagram.

Swarthout: I was just thinking historically what they could be dragging over there over time.

Melchior: When I look at it just from the map there, it's not inconceivable that their sphere of influence would drag something along the Foothill corridor.

Buril: In fact, it's very possible in my mind. Those wells are very high production wells.

We're hoping that MW-21 will provide us with a data point for understanding the plume coming out of La Cañada, if there is one.

Bishop: I guess that I don't see anything wrong with your supposition, but it just seems just as likely to me that you have the same thing going on from the Lab that you have when you're proposing you have a plume coming in from La Cañada. You've got the highest PCE on-Lab. You've got high upgradient of carbon tetrachloride, you've got high TCE in your wells. Neither of them match the signature. Both of them show cross-gradient wells that are clean, so I guess what I'm saying is let's not just hang our hat on this supposition.

Buril: Oh no, that's not the point, John. We're not doing that. What we're doing here is just raising this issue to your attention. As we get more information available to us through the completion of Well 21 and trying to analyze some of the water-level data we will be able to understand the situation better.

Niou: I thought the newer ones are.

Buril: No, not all of them are. They all are in OU-3 [offsite groundwater], but OU-1 is both stand pipe and multiport.

Niou: I'm curious, does the lower portion of the aquifer show a different gradient or show some different head, trend, or something?

Buril: Yes, it does.

Cutler: Yes, there is a vertical flow direction, a vertical component to the system.

Niou: If so, then for deeper portions we probably don't have enough data, but the shallow portions would definitely have more than enough data.

Buril: The only question though, Steven, is that when you look at the deeper portions through the multiports, they're clean. In that situation, gathering more data on the deeper portions doesn't appear to be warranted.

Melchior: I think when we get 21 in, there might be some additional information about the vertical component for the south and to the west of the facility.

Robles: Any other questions?

Swarthout/Bishop: So if, for example, you were just hypothetically to put a well down by Building 301. What would you expect from that well?

Buril: I would expect that well would be almost completely clean. If we placed a well in that general vicinity, I would expect the area in 301 would be essentially clean.

Niou: But, let me continue my previous question. For those areas on the Lab. Are any of them deep?

Buril: No, they're all stand pipe.

Niou: Then, you say the deeper ones are clean. Basically, you haven't investigated into the deeper zone center part, right?

Buril: If you take a look at MW-11, just outside the quadrilateral, that is a multiport well. That shows essentially clean all the way down.

The upper two screens are 0.6 ppb carbon tetrachloride, but after that its clean.

Bishop: What was MW-12.

Buril: Well 12: The top screen was clean; second screen 0.8 ppb of carbon tetrachloride, 1.0 ppb of PCE, 3 of TCE; and third screen carbon tet 3.5 ppb; and fourth screen 2.1 ppb.

Swarthout: And what was 4 in the deeper zones.

Melchior: Four is clean in the deep zones.

Swarthout: So that would indicate that there is a southeastern component.

Buril: Perhaps at one time. Perhaps there is an indication. Obviously we had a problem at one point because it made its way into the Pasadena wells.

Swarthout: Maybe, you have a plume that's bounded by 11, 3, and 4.

Melchior: Yes, I think so. When you look at the chemistries, it makes a pretty good fit. That very well may be because of the mounding related to the arroyo with the episodic events of the arroyo filling, creating that mound and basically confining the contaminants within the Lab.

Swarthout: And what is south of MW-10? Are there any drinking water wells or anything south of that area?

Buril: The only drinking water wells are the City of Pasadena and Lincoln Avenue. That's the Valley Water Service well to the West.

Nakashima: What kind of flow direction do you have down in the south near Wells 4, 5, and 10.

Cutler: We don't have the data from all the wells plotted on the maps yet. At the five new wells, we sampled them at the beginning and end of each sampling event, and that data has not been finalized, so I can't specifically answer that.

Buril: Comments, questions?

Swarthout: Yes, I was wondering, now that we've done two rounds of sampling, are there plans to do any more sampling?

Buril: Not currently. It's not called out in the work plan, although I guess that's something we would probably want to take a look at and determine what it is we do want to do.

Swarthout: Yes, I think it's worth looking at, you know, maybe not sampling every well and every screen but if you've had clean samples in both sampling rounds in a screen you can maybe not sample it, but it might be worth sampling the other wells.

Buril: We might want to take a look at moving forward with feasibility of doing something in the area of Wells 7, 8, 13, 16 up front. We've got a historical high concentration in that area in Well 7. And if we were to investigate the feasibility of an interim remedial action in that area to confine those contaminants through say, a pump-and-treat system, we would hopefully negate the potential for migration. It would give us an opportunity to try and figure out what else is going on here.

Swarthout: I think it's really good we seem to have a really good data set as far as contaminants. That's why I was thinking it would be good for us to be collecting some of the ground water contaminant data and not wait a year.

Bishop: Are you looking at specifics like PCE, TCE, and carbon tet.

Robles: Because those are the finger prints that we're looking for, not for the sake of just finding contamination but seeing where specific plumes are moving and so on.

Swarthout: So I assume that when we did the sampling before that you guys did a full sweep, so maybe you could eliminate collecting the semi-volatiles, metals and just collect the volatiles to continue. This is the point now where we can think about it. You know we're not necessarily screening as much any more.

Melchior: It may be important to do that just to determine bounding and to do a conceptual design looking at contaminant variations. Carbon tet is not going to be easy to remove from water regardless of whatever technology you use, so its variation with time will be very important to the designers.

Robles: Now it took us just a little technology to determine what's there. We'll need to start getting the hard science in the ground to bound what is happening under there. This is so complex that it's going to be the biggest stumbling block for us to do a feasibility study if we do not characterize it properly: How the waters are flowing; where is the contamination coming from; is it offsite-onsite, onsite-offsite; is it staying there? We may be cleaning a lot of La Cañada-

Flintridge's contamination, and it's futile to just clean the plume when they need to take care of their sources.

Bishop: That assumes that the contaminants are coming from them.

Buril: That will be one of the things that we will have to continue to try to understand. But in looking at this it becomes abundantly clear that to me that the area defined by Wells 7, 8, 13 and 16 has significant enough concentrations to warrant some action. And, in that regard, determining what kind of action would be necessary to deal with that particular location is prudent. If we are able to establish a system whereby we mitigate the migration potential, then whatever flow reversals and flow regimes that may ultimately come to pass, we've already addressed those, and we're preventing that material from migrating through into other areas.

Bishop: I agree with you a hundred percent on what you want to do. I'm just concerned that you have a mental picture that the area you identified is the extent of your problem because you've got your Well 16 at almost the same level as 7. I mean, 310 and 200 are very close. So is this continuing much farther to the west? You don't really know. I'm not saying you don't want to look at interim remedial action. I think you need to start also opening your mind set and saying okay, is this the extent, do we have it fairly well bounded. What if the extent is actually three times this because this is just a data point?

Buril: Well, I think one of the things in the feasibility study that we'll have to look at is how hard do we have to pump this system in order to reach an area of influence that we feel is justified by what we see today. And do we need to put more wells out there? Well, maybe that's part of the feasibility study design.

Bishop: That's right, and those are things that go into a feasibility design. I'm just bringing it up now so it doesn't seem like a shock to you in the future.

Robles: Anything else

2. Results of First Round of Soil Vapor Sampling Performed Under Field Sampling and Analysis Plan for OU-2

Buril: What I've got is the first round of sampling. We just got the data back from the soil gas lab.

The numbers we are seeing are vanishingly small at nearly every location. While I haven't had a chance to go through all of the data, there was none that I saw.

Buril: When added all together, that even came near approaching the 1 ppm number that we identified in the work plan. We're still well below that level.

Robles: What was the max?

Melchior: I think there's a large preponderance of the samples that are in the 1 microgram per liter. What way should

we take this? Certainly they're elevated numbers, but there's a large preponderance of numbers right near the detection limit.

Robles: But they're not in the ppm range?

Buril: No, when you add them all together there is not one near a 1 ppm level. So, in trying to understand what we've got here, it appears that the sources that we're dealing with have essentially exhausted themselves. And, if you look at this from a pragmatic standpoint, that makes a good deal of sense. These things were in operation 40 to 45 years ago. As a result, you have all that time for these things to essentially clean themselves up through whatever mechanism.

Another thing that's important to recognize too is that when you're dealing with these sources, the operations that used these chemicals involve flushing. So there was not only the chemical itself, but there was a great deal of water that went in the pits with them. So there was a certain amount of flushing that went on in the soil at the time the material was deposited, which probably carried it to the ground water. The extent of the time that we have from the time of deposition to today is very long. When we're looking to see what's left, it's simply not there any more.

Bishop: When do you expect to have that data in some format where we can take a look at it?

Melchior: Well, we've got another round coming up first. And the first one's got to go through the chromatograph validation to make sure the peaks identified are correct. I wouldn't say any earlier than 3 to 4 weeks.

Randolph: We haven't received the chromatographs yet.

Melchior: No, so it's going to be a minimum of 4 weeks.

Bishop: I would expect to have most low and some elevated cause that's where your sources would be in the environment.

Buril: In looking at it from the overall standpoint, it's basically telling us that there's essentially no major source still in existence in the locations that we've viewed.

Randolph: The only thing that it does kind of confirm that is that we've had one hot hole for carbon tet. That was in boring 16.

Randolph: We had our highest concentrations in the neighborhood of 175 to 200 micrograms per liter at depths of 80 and 95 feet and nothing above it.

Buril: There's a question of the correction factor for the weight of air versus volume. That makes a great deal of sense because you're in the middle of an area that has noted carbon tet contamination in the groundwater. Eighty to ninety feet, I would guess you're coming awfully close to the capillary zone in that particular area. And so, you would expect to see an elevated level at that point.

Randolph: In that same hole, at a depth of 60 feet, we had 8.9 micrograms per liter and nothing above it.

Buril: So what it's telling us then is that the sources have expended themselves into the ground water. And so, we're faced with a situation where 25 years ago it may have been

reversed, but because of the length of time these materials had to dissipate into the environment, we're now faced with essentially what appears to be a groundwater problem.

Melchior: This makes some sense if you think of how the contaminants might have entered the environment through these waste pits or seepage pits. Any contaminant that might have been disposed would also have been flushed with fairly large quantities of water, relatively speaking, so as the material would seep into the ground it certainly would be flushed continuously with water that would be expended into those waste pits through normal use of the water system at that building.

Randolph: I believe that's what we should expect.

Buril: This is actually what we had expected to see. We thought maybe we might find one or two "smoking guns," but we didn't even find that per se. In fact, this data is bearing out our original hypothesis; that the sources are essentially expended and that we are dealing with principally a groundwater problem.

Randolph: The first week in March.

Robles: Any other questions.

Swarthout: What are those pits below Building 67? Were there any hits in those?

Buril: That's pit number 19A, it went down as deep as 96 feet.

Swarthout: This is getting back to Number 1 on our list, but what would be the feasibility of, since you have a drill rig or drill rigs out now, putting a well in around that building or see if you have the extent of contamination defined.

Because you have those wells on the east side that you have your contamination bounded on the east side. But then when you go to the west side, you have to go all the way over to MW-6.

Buril: Sample for one between MW-6 and MW-16?

Swarthout: And then between 13 and 10.

You have this area where you have a big question mark, so it seems like it could use a well in between MW-16 and MW-6 as well as between MW-13 and MW-10. It would seem that would be the two because you do have all these wells that indicate you don't have too much contamination over here.

Melchior: The goal of those wells, how would that relate to the feasibility study?

Swarthout: Well, when you eventually do cleanup, you have to clean it to a certain level. And if you don't know the extent of your contamination, then it's hard to say to what area you have to do the cleanup.

Melchior: Wouldn't the cleanup be based on MCL [maximum contaminant level] values that the areal extent of which would vary with time?

Bishop: If the end of the contamination is here [marks on the map], you can pump a lot less than if it's here [marks on map]. And if you don't know, you're going to be pumping out from here because you have no reason to just draw your cone here as opposed to right here. And that makes a big difference on money.

Melchior: I recognize all the things you're saying about areal extent. I'm just trying to look at the impact. Really, it's more of a design issue, the determination of what alternatives that would be used to extract the water and to treat it. So, I'm wondering about the timing whether it's more of a design issue or an issue for the RI.

Buril: In other words, should this come at the point of the FS or at the point of remedial investigation

Swarthout: In theory, your RI [remedial investigation], is supposed to have the extent of the contamination defined. Obviously, that's just in theory. We could go ahead, if we could agree this was the extent and the nature of the contamination, we could probably design a treatment system in general for what's going on. You could do these as part of your RDRA or something like that. And you could have anything over here. And you could make the argument that you should do this because, as Jon was saying, there's quite a bit of volume consideration. You may say, okay, we know there's some contamination so we're putting in some extraction wells. And at the same time we're putting in those extraction wells, we're going to put in a couple more monitoring wells. And in the second phase of the treatment, if we need to, we can put additional extraction wells.

Robles: So we combined them as extraction and sampling wells.

Buril: You're talking about an awesome cost.

Swarthout: The thing is though, here you already have two rounds of data. You could then put in your extraction wells. While here you're going to have to put in monitoring wells, and you should have at least two rounds of data before you're going to put in any extraction wells or make any decisions about what you're going to do over here. So, it would be good to get a head start on this before you wait for a ROD. That would just be my opinion.

Buril: That's reasonable. I hate to get back to the root of all evil on this but unfortunately I have to only because our budget for this year is fixed. Based on our projected spending we are at 101% spent. So I don't think that doing it now is going to be practical for us. I don't know whether NASA can break loose the funds that would allow us to do that. First of all, let's clarify. Are you thinking of standpipe wells or multiports?

Swarthout: Well, I was just thinking primarily it would be nice to have wells with a couple of sampling points. I know these go down to five or six sampling points. I don't think that's necessary, but it would be nice to have a well that has a sampling point at the surface, at the water table, and one 20 feet deeper. Because if you're going to be out there doing it, it's worth it moneywise to get it.

Buril: Out of curiosity, Mark, what's the unit cost per multiport well that we're putting in for OU-1?

Cutler: Between a hundred and a hundred-fifty thousand, but that was all five screens.

Buril: So, we could be talking a quarter million dollars for some additional wells, easily.

Melchior: Two deep ones. We wouldn't need five screens, two or three.

Swarthout: I just think that in the future, this would be a point that we would make in our RI and FS is saying that we don't have this area really bounded with the extent.

Buril: Yes. I would disagree with you only from the standpoint of looking at the westerly direction that we do have it bounded because 6 and 14 are clean. It just doesn't give us the gradation of where it is clean to where it hits the MCL. And, depending on the nature of the remedial design, you may or may not need that information.

Niou: How about the northwest?

Buril: Directly northwest, you run into a fault. Personally, I would not see a need to put one between here and on the fault, that's a boundary.

Swarthout: And this is pretty much against a hill isn't it?

Buril: Yes, in fact, we're in the hills at that location.

Randolph: Right, some of them are in rock cut on the north side of the fault.

Robles: When you come into this building, you see an architectural model of that. We're right into the hills.

Bishop: We've got two different possibilities here, both of which have merit, and until we have some more information. I am concerned though that 21 may or may not help. It may just come up and give us no more information. It may really help if it's really hot.

Bishop: I meant MW-21, sorry.

Buril: Well, again that's one of the reasons that we placed it there is we did have a concern about what might be coming out of La Cañada, especially given the history of that essentially bedroom community. They had a common practice of pouring solvents down the drains to keep their septic systems clean. It's a totally non-severed community in the older parts, and it's a fairly old community.

Robles: They've been asking us about that specific chemical (PCE) because they were hoping that we were the ones generating it.

Federal policy has always been that if we caused it, we clean it up. But we do not use taxpayer dollars to clean state and local problems.

Buril: I think the best thing is to get the information so we understand this whole thing before talking about who is going to pay for what.

3. Status of Work Associated with Field Sampling and Analysis Plan for OU-3

Buril: Actually, this is going better than I had hoped.

Anyway, we started drilling--What was it BG, last Friday? We're just shy of a full 5 day's work, and we're down to 350 feet plus. And it appears we may actually be done with drilling at this location some time tomorrow or Friday. It was almost aghast at how well this one went. It was really a wonderful experience in comparison with what we had on site a couple times.

We are anticipating a second rig coming on, hopefully within the next 2 to 3 weeks. We have not got a strong date for you simply because the drilling company needs to build a new mud system or to break one loose from an existing site to be able to use. The actual drill rig itself is available. So, as soon as that's available to us in one fashion or another, we'll have a second rig available.

Hopefully, we'll be drilling two sites within about 3 to 4 weeks. But we'll by no means be back to the schedule that you have currently, which brings up the question to me as to whether or not there's opportunity for you to discuss with your management our concept. That was the idea of one sampling round of OU-3 as opposed to two.

Our thought process again, was if we go out there and we punch wells that are what I will term essentially clean, not being an excess of an MCL and not really posing a threat to any given municipal well, that at that juncture our approach would be to monitor and make sure that nothing else unusual happens. But, if we are going to be in a position of having to mandatorily do two rounds regardless of that concept, then we can put together a schedule that is going to be stretched by at least 6 months because of the wet season/dry season issue again.

Swarthout: My opinion is that you need two rounds of sampling. And I think that if you did one round and then did one round a quarter later we could go with that. To me, it doesn't seem on this side of the arroyo that the wet season/dry season is such a big issue.

Buril: Given the fact that we would be probably monitoring out there anyway, if at some point in the future we actually found a slug of TCE that we didn't see before, we would be obligated to reevaluate the ROD, wouldn't we?

Swarthout: Yes, I think you would. The only thing is, at that point, it would be infinitely more complicated administratively.

Buril: I'm not familiar with that part.

Swarthout: Well, if we write a feasibility study and we finalize the feasibility study, or if we write a ROD and finalize a ROD, then to change those things is very complicated.

Robles: So you can't really sign one off until you get both rounds. Until you feel confident enough.

Swarthout: Yes, until I feel confident enough about that data. Also, I think that if we do write a ROD and then things change, and then the base or the facility decides not to reopen the ROD because we've already signed it.

Bishop: It seems to me, and maybe I've got my schedule wrong, that we're talking about these wells that you're going to be putting in now in the next few months, right.

Buril: Yes.

Bishop: Well, let me put it this way. It's going to take you until December to get your RI out?

Buril: Probably.

Bishop: So if you include in your process that you're going to be having another round of samples 3 months later, which is what Brian's talking about, some time in July say or August, that time frame. You don't have to wait until you get your last data sample validated before you start working on your RI.

Buril: In fact that's true. We have many portions, including the first three sections, in draft form right now. I'm concerned with the amount of time that would take, as well as what impact it would have on the schedule.

Swarthout: What I think we can maybe do is figure out some way that you do that one round of sampling. Then, you begin writing the RI for that, and you can even start writing the FS. You know we can all work together I think such that we can agree we're going down this one path. And we should collect the second round of data before we make any final decisions, and then if there are any changes we may have to backtrack somewhat and make those changes. But if the data that we collect in the second round is similar to the data that we collect from the first round, we can just stay on that path. Then, you can either finalize the RI and begin working on the FS and you can just submit a thinner supplement to the RI that contains the second round of data, or you could actually wait to finalize the RI before you actually get the second round of data.

Buril: That does make sense.

Robles: That makes sense. I know your dilemma. You've got to have two rounds. Otherwise, your superior is going to have some problems with that.

Swarthout: I also feel personally that we should have an additional round of data before we make a final decision. Like I said, I think if we can collect one round of data and agree this is how it's going, we can do that. Then, if the second round of data gives us similar information, we can just continue doing that. But, I would feel uncomfortable finalizing an RI, finalizing an FS, and then signing a ROD without a second round of data. Now, I can agree to finalize the RI. I think we can all agree that we would be collecting a second round of data and revisit it if we have to.

Buril: Exactly, if we viewed it as a verification it is feasible to consider going on with whatever pathway that we pick based on the second round of data.

Swarthout: Yes, you could finalize the RI with the one round of data, and then taking another round of data, you could include that data as part of the FS if you wanted to do. You could have a separate section in the FS that's kind of an RI section.

I think we should try to work together to make things go as fast as possible, and we can be as creative as we want as long as we have two rounds.

Buril: If we take a second round during the feasibility study portion and it helps augment the data and tells us we're going in the right direction, I think that would work. That's simply a scheduling consideration as opposed to a technical consideration.

I'd like to have more than one set of data to make a final decision on, but it just depends on where that second set of data is taken and how it impacts. I think if we can work through this and Foster-Wheeler can come up with how we're going to pull it together, in concept what you're proposing seems reasonable.

Bishop: I don't have a problem with that at all. I think that it should be pretty straight forward to start along that process, and unless something changes.

Buril: Yes, if we go out there, and the first round of data shows there's nothing there and the second round suddenly shows there's a thousand parts per billion out there, the whole process breaks down.

Bishop: There would be no point in trying to sign a ROD.

Robles: All bets are off, and everything's out the window, and we've got to scratch our head and ask, what do we do from here?

Buril: Okay, well let me talk to Foster-Wheeler and see how we might best be able to come up with that.

Perhaps, let me make the suggestion that when we get together, we might make an appointment for a telecon. I can't give you a date now because I don't know how long this is going to take. Perhaps once we've had a talk to understand impacts to budget and everything else that goes along with it, we may be able to telecon and discuss what we've come up with.

Swarthout: Yes, I would just be concerned if there were order-of-magnitude differences between first and second round.

Buril: I agree. That would bring the entire process to a grinding halt.

Robles: Any others? Let's get on to our Eco-Tox study.

Swarthout: Just a moment. Does that sound reasonable to you, Penny?

Nakashima: Yes, ...

4. Eco-Tox Study

Buril: Okay, on the Eco-Tox study, this is going to fold into number five also. So when I go through this, I just want to be sure that you recognize we may be drifting back and forth between those two points.

Swarthout: When are you going to start drilling in somebody's front yard or in the neighborhood?

Buril: Probably 3 or 4 weeks.

Swarthout: Because I'm wondering (this is just something from when we went out and saw the drilling yesterday), do you think people know what's coming?

Buril: Let me explain what we've done thus far. You're point's well taken and the question timely from the standpoint that we are getting ready to go out there. We have had a meeting with the people in the Seventh Day Adventist Church whose location is MW-20. Their congregation is fully aware of what's going to be happening in their church parking lot.

Robles: I think they negotiated already.

Buril: Well, it's done. It's sealed and signed. We have their permission.

Swarthout: Are you going to be working on Sunday.

Buril: No, nor on Saturday, and we will be out of there by 3 p.m. on Friday, which is the beginning of their Sabbath. So, they're very well aware. The area within a half mile radius of the border of the Lab received fact sheets. We told them we were coming out into the city in January approximately,

Now, the last part that we're planning on is at each individual site, we're taking hand-delivered notices (letters) to each individual residence and providing that to them. The letters say this is going on, these are the hours, these are the things that we will be doing, there's going to be sound curtains, there's going to be guards, there's going to be a fence, etc. If you have any questions, just contact us at these numbers. I think the four fact sheets that we have available to us now will be included so that people have the full gamut of information available to them. That will happen a couple weeks before we actually go into the field.

Swarthout: So, you'll do that at each site a couple weeks before. Okay.

Buril: Thus far, we have had no negative comment from the population surrounding JPL.

Swarthout: For me, what you said you're going to be doing a week or two before checking around with people is good.

Buril: Absolutely we want to be sure they know what's going on.

Okay, on the ecological-toxicological study, we were looking at this and trying to establish how we could deal with these issues as effectively as we can. And what we were doing is trying to understand how the arroyo versus the site is going to be involved. And trying to deal with this in an operable-unit basis. For OU-1 we're dealing principally with a groundwater issue. And so from that stand point, we were looking at the ecological risk assessment, while not easy, it would be something that would probably not entail a great deal of work in terms of going out and doing sampling and so forth. There would need to be surveys and so on.

But, because we don't have an artesian condition here within the site, there's no exposure to groundwater. And as such, environmental receptors are very unlikely. In fact, it's not

likely at all that they would have an exposure pathway as a result of groundwater.

Swarthout: For the ecological risk assessment, that sounds along the lines of what we're looking for. I think we're going to be interested--although there is probably not a pathway for contamination--I think we're still going to be interested in knowing what the potential receptors are.

Buril: Part of that will have to be specified in the survey. That's not unreasonable.

Swarthout: Right. I think either we'll expect somebody to visit the site and walk around to look in the obvious areas where the animals would be living, and then to determine that there isn't a risk due to the fact that there isn't a pathway. I'm not saying there isn't a pathway, but if there isn't a pathway, then that would be reasonable for the eco risk.

For the human health risk it's a little different because the fact that there isn't a pathway at the present time does not necessarily mean that there won't be a pathway in the future. The way we usually do risk assessments is we have to determine what we think is a conservative attempt for the exposure assessment and use that exposure assessment for the risk assessment. And that may mean taking the plume and either taking the highest concentration or taking the average of concentrations over the plume or determining what would be the best concentration and doing your exposure assessment in that way.

Robles: Even though there might not be a pathway, we have to assume there will be a pathway?

Swarthout: You have to assume that there is the potential to be a pathway in the future.

Robles: What kind of assumptions do we then make? Trenching, digging, people working in that area like our facilities people? I could see that.

Swarthout: Right. It depends on the type of exposure assessment. You could take the assumption that 20 years from now NASA is not going to be here, and there's going to be houses and buildings, and people could be putting drinking water wells in this area.

Robles: Whoa, wait! Time Out! Assumptions are one thing, but that is way out.

Swarthout: Right. The other extreme is that NASA is going to be here forever, and the people who work here are being exposed as a result of working here, which means there would be less likely exposure.

Robles: I look at the activities we do here presently, particularly people that dig in the ground or so on. I'm looking at digging into the ground or building new buildings, or raising up or razing down new buildings. That's one thing. Those are the kind of things that I look at. If the facility ever closes up, or it is turned over to private hands, it would still be used. I can't even envision that this place would ever be replaced with homes. The capital investment for this facility is over billions of dollars to replace.

Swarthout: One of the ways we looked at it at George Air Force Base was you could put your drinking water wells or your exposure points at the edge of the base. You determine through modeling and through other data that you have what the concentrations would be when the contamination on base would reach off base. So if you have 200 parts per billion in MW-16, what would be the exposure when we get to the east side of the base.

Swarthout: I think when you do your risk assessment you'll do it for a soil. Then you'll do it for groundwater. But it is possible that you will have some risk, be it above or below the threshold, you know, ten to the minus six. It is likely that you will have some type of risk as you get off base and you put your exposure points on the east side of the base.

Robles: I see the number one, largest risk, is when we start doing the remedial program. When we start bringing that water to the surface, it's going to be the largest amount of exposure. But, as you get off site, I don't see a risk. Say somebody moves to the east side of the base and puts a drinking well and starts drinking the water; that's where you would get your risk from.

Richards: Yes, but the basin is adjudicated.

Swarthout: I can't argue the finer legal points of adjudication, but for the point of doing the risk assessment that's how you would want to do your risk assessment. You have to do a risk assessment.

I think that what we need to do is, I need to talk to Dan Stralka again, and we need to figure out exactly what the exposure assessment is going to be.

Robles: We know we have to do a risk assessment. We want to do a risk assessment because that's going to be the main driver in determining how much cleanup we're going to have to do.

Swarthout: A lot of this is policy that EPA has for the purpose of the risk assessment, put your exposure point in the middle of the plume and do a residential risk assessment. That's been done before.

Robles: It's a possibility only if a residential project could go in there.

Swarthout: All I would say is that's been done before, purposely. We're not even considering that now.

Robles: That makes sense. But not like in this case. That's what I'm saying. There has to be some sanity behind that, and that's all we're asking.

Swarthout: Right. I understand you asking that.

Melchior: The same thing goes for talking about the depth of soil exposure earlier. The data we have today, at least the unvalidated soil vapor data, in terms of VOCs, we see at eighty to a hundred feet. How you translate that to surface exposures, I'm going to be very curious to see how the agencies respond to that. From my perspective, there is no exposure within a reasonable construction zone in the soil.

Swarthout: And we may be able to come to that agreement. Those are things we need to work out. I think it's worth us getting together and determining what the exposure assessment is going to be as opposed to you guys doing it and then submitting it to us.

Buril: Agreed absolutely.

Melchior: I think we need to get all the data in before we do that.

Buril: That's really what we need to have to understand if we're really dealing with an issue because of the contamination, or it's an issue as a result of trying to clear policy considerations.

Swarthout: I will speak to some people at EPA about this to try to determine what we want to do, especially taking the way things look now for the groundwater and try to determine what would we do.

Now, let's just talk about one other thing. There are two criteria that you have to meet that are part of the nine criteria. One is protection of human health and the environment, which is what we just finished speaking about. The other one is ARARs, which means applicable or relevant and appropriate requirements. Those types of things may come into play regardless of risk. So, you may be above an ARAR, but you may be below the risk, and there's the potential for having to do cleanup to meet the ARAR.

Robles: To date, as far as I can see, 99% of our problems are in the groundwater. That's what we've got to treat.

Swarthout: And you do have groundwater above the MCL.

Buril: That one's easy to figure out. The things that we look to also when we come to the ARARs issue is the adjudicated basin. While not, perhaps, not an ARAR specifically, it is a TBC, to be considered problem. From that standpoint, I would think that whatever risk that we may identify as a result of going through our risk assessment on the edge of the facility, that when we factor in the TBCs, the ARARs, and so forth, that govern whether not we can actually extract water, that we may identify that the risk may be ten to the minus six, ten to the minus five, whatever it is. But the fact that we are held back from creating a pathway of exposure as a result of adjudication.

Bishop: Be careful about that. Adjudication says new people can't come in. It doesn't say that the people that are already adjudicated can't put in new wells.

Buril: Your point is well made. I think that maybe the context in which I'm talking about is really in terms of someone building a house and punching his own drinking water well. That's not going to happen. But your point is that they could go to the west side of the arroyo, drill a well perfectly legal, and start pumping. But again, that would be a situation where you would have to step in and say if you're going to put a well there you're going to have to take this into consideration.

Bishop: It may not be appropriate here, but in other areas the issue has been at what point are you looking at to reach MCL,

because all the distance from the site to that point you have now written off. You said that portion of the groundwater basin is no longer usable for drinking water. If they supposedly have a right to pump in that basin, you have now told them they no longer have a right in this area, essentially, because you're using a weapon. The example usually is that the nearest drinking water well in a mile away, and we feel from our assessment that it will be below MCL before it gets there. But in that intermediate mile you have now said that it is no longer available to them. And that has to be taken into consideration not so much for the risk assessment but in the discussions with them. The people who have adjudication and in terms of degradation of supply.

Buril: Would that really be a CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] consideration, or would that be a site management and basin management consideration.

Bishop: Well, it becomes an ARAR consideration to the Board. By your decision in CERCLA on where you're going to put your treatment, you have designated a certain area of resource as unavailable and unusable. And, it's not that it can't happen. I mean, there are times when you have to say it's just not feasible to do this, but it has to be considered. It's not necessarily the existing drinking water wells that are the only consideration.

Buril: I see what you're saying.

Okay, still on the groundwater portion of this, when we start talking about OU-1 and OU-3, they should be essentially handled in the same way because it's going to be dealing with groundwater issues. And, whatever decisions have been made ultimately with OU-1 will probably (with minor modifications for points of exposure) be adopted for OU-3 as well. Is that a reasonable approach at this juncture? [agencies agree]

On OU-2, this is one that begins to step into the concern with the arroyo. And this is one that I think is most nebulous to us. When we start talking about dealing with the soils, we're talking about on the facility itself as the beginning point, and that we would be looking at things such as construction considerations.

But, moving beyond the boundaries of JPL becomes very much a concern, and it becomes a concern because 1) that's one of the areas that we do not feel we have a major impact on, and 2) there is also consideration for the city of Pasadena having granted permission not only to JPL but to other entities to dispose of materials in the Arroyo over the course of time. So we get into an issue of 1) it's not our property, and 2) it may not be our problem.

Robles: What do you guys want us to do? That's the bottom line. What do you want us to do with the Arroyo Seco?

Swarthout: Well, I think, if there's something that you dumped in the arroyo, regardless if it's your property or not, I'm fairly certain you could be held liable for the cleanup.

Robles: What cleanup and what contamination and where is it, and how are we going to find it?

Buril: Yes, that's the concern I have in trying to address what it is we want to do in the arroyo. Taking into consideration, chromate potentially being placed in the arroyo, the second of water with perchlorethylene being placed in the arroyo. The perchlorethylene was done 5 years ago approximately. The chromate was some 30 plus years ago.

Now, it's just unfortunate that you didn't get here when it was raining so hard. You would have seen what a dynamic environment the arroyo is. There was a raging river flowing through that thing that was just unbelievable. It was Colorado River style kind of white water that was going through there. But my point being is that because of that dynamic system of erosion, deposition, erosion, deposition, erosion, deposition; we haven't a clue where to look for this stuff. And, in fact, because it has been so greatly dispersed, that even if we looked we probably wouldn't find it.

Robles: Say we did find it. What do we do? Whose is it? Is it ours? Do we clean up the whole Arroyo? Not on your life. We're not cleaning up the Arroyo Seco. It's a no man's land.

What do we do? You know, we can go up there and sample all we want to, and whether we find something or don't find something, what does that mean? If we don't find something, what do you want us to do? Dig? Put more wells down? What are we going to do with it? I mean it's something that I can't fathom.

As I said, our premise is that if we caused it, and we did, and we can find it; we'll treat it. The question is, we go out there, we take a sample right at the end of the pipe. If we don't find anything, is that the end?

Buril: I guess one of the things you might consider is from practical application of what it is we can do based on our knowledge of the way the arroyo works. And I think it's very easy to recognize that it's a very dynamic system. There's constant erosion, deposition, water leaching, and so forth. The probability of us being able to go out and identify a problem that's some thirty years old or maybe more is a ridiculous notion. We can't do it. There's no way to say it's going to be here or it's going to be there or it's going to be there. If we look here, well why didn't we look over here, why didn't we look there? If we put a ten-foot grid across the arroyo, we may still never find anything at all. And when we do find something, if we find something, who is to say that's not something that was placed there by the city of Pasadena, by someone who was contracted to the city of Pasadena. Who is to say whose it is? And even if we did find it, is it something we really need to be concerned with. And the reason I bring that issue up is that if we're going to be concerned with something of this nature, then in all likelihood we're going to be concerned with what we've identified as the most likely route of exposure at this time. That's the groundwater, because a concern with great quantities of metals or volatiles or anything else being in the surficial

soils. There's just no reason to expect that would be there. So, if you take a look at what the next reasonable avenue of exposure would be, it's going to be the ground water. And, we have a well monitoring in place that can identify a chromate, a perchlorethylene, or other issues that we may not be aware of at the point of, or media of, possible exposure.

Robles: I want to address the concept that I said that it was not our responsibility off the site. If we contaminated it, it is our responsibility. That's bottom line. The concern I have is it's not our responsibility to clean up the Arroyo Seco in total. And the question is how do we determine that? If there's some way that we can determine that, then I'm for it. Let's go out there and find out if it's ours. If there's some technology, methodology that will prove we did this. I don't know if you're going to find something. And I don't know if you will find something. What's going to happen?

Buril: Let me give a for instance. All JPL storm drains drain onto the Arroyo Seco. We have monitors in place as a result of our storm water requirements.

We have the city of Altadena that also drains into the arroyo. The city of La Cañada-Flintridge shares our storm sewer system for the eastern portion of their city. It comes under JPL and discharges into the arroyo.

Now, say we've got hydrocarbon contamination. Did that come off the city parking lots? Did that come off JPL? Did it come out of Altadena? How do we make that determination? I think Pete's point is that it really can't be the federal government's entire responsibility to clean up this entire mess when there are so many potential parties.

Nakashima: How about the areas where the photos show that there's some pits or exposed areas?

Buril: That's where we get into the very interesting arena of whose pits are they.

Look at the aerial photo and take a look at how this road is constructed here. It's coming from off JPL property and over to here. And the employees that were around back then tell me that that was a Pasadena dump, that the city used that.

Nakashima: In the latest pictures, now you have a parking lot over that area.

Buril: Yes, but it doesn't say that we created a problem. It says that we built a parking lot over an area that we were able to procure for our use.

Robles: Have we taken any samples from the edge of the property?

Swarthout: Well, BG was just saying that Boring 12 was right in the middle of that, at least the one that was identified.

Robles: What did you find there?

Randolph: Nothing. There's nothing there, and that's kind of what we expected to find because that whole area had been wiped out in a flood many, many years ago.

Buril: Again, that goes back to the dynamic nature of the arroyo. Back in the early Sixties I think it was, there was a horrendous flood in this area, and as a result, JPL lost a good part of its parking lot. It was washed away, and anything that was in the arroyo in this area, deposited by whomever, was more than likely stripped out and is gone. We don't know where to look for it.

So this is where we come to the question, how do we bound this system? If you talk about the bounds being the Arroyo Seco, it's unreasonable. If you talk about the bounds being where the pits were, then the question arises as to who's responsible. At the time the pits were in use, based on the aerial photos, they were not JPL operated.

Nakashima: It just concerns me from these letters. There were a lot of things that were disposed of in the Arroyo which came from JPL.

Buril: Well, the two things that I can think of would be the aluminum oxide and the chromate. Using the same intuitive argument that we're dealing with something that has been deposited, stripped, and leached, deposited, stripped, and leached. That material is heaven knows where. We have no idea.

Bishop: When did you stop discharging to the arroyo?

Buril: It was about the same time frame is my understanding.

Bishop: Do you still have those discharges?

Buril: Oh no, no. We're not still doing that. I understand your point. We're not doing that. As I understand it's been stopped for decades.

Bishop: You don't have any cooling water towers?

Buril: We have lots of cooling water towers, but they are not discharged to the arroyo. They are discharged through the sanitation system.

Bishop: And that's the question. If that happened twenty years ago, it's a lot different.

Robles: The other item is: If there was contamination we would see some presence in the groundwater. We're not seeing anything in the Pasadena wells.

Buril: And we're not seeing anything in our own monitoring wells either.

Nakashima: If you still have a source on the surface, then it is a potential threat.

Buril: The point being though, that with the nature of the arroyo, anything that would be on the surface is gone.

Nakashima: Then if you have the metals washing down to where they're going to build this wildlife preserve.

Buril: What metals are you thinking of?

Nakashima: Well, I'm thinking of the chrome and aluminum.

Buril: Okay, the aluminum issue is something I would like to try to put to bed.

Nakashima: I think it also depends on what conditions you have out there in the arroyo because if you have conditions where it becomes dissolved---

Robles: Let's separate the issues. If they build the water park, they being the Hahamonga, they are the ones that are responsible to protect the animals that come down there, not us.

Nakashima: Well, the eco assessment will have to address that.

Robles: The water park?

Swarthout: If you have contamination that's coming from JPL that's getting into the water park, it's your problem. It's not Hahamonga's.

Robles: The Hahamonga Project is impacting us. They need to do an eco-tox study.

Buril: Well, I think I understand what Brian is saying, but let's turn that point over for just a moment. If we have any way of going out there with any reasonable certainty and say that something that was done thirty years ago is now creating a problem.

Swarthout: Yes.

Buril: We have no way to do that whatsoever. And from that stand point, if we cannot do that kind of work, then what do we do? We don't know. I'm at a loss to deal with that issue. Intuitively, it makes sense that if you had a tremendous dynamic system that you're not going to find the small amounts of materials that you're talking about. They're simply not going to be there any more. They're going to be so dispersed and so removed from their original locations. Where they might have been concentrated and maybe a potential concern that they're no longer a concern.

It's like an automobile exhaust. If you put it in a garage and run it for an hour and walk in there, that's a pretty bad thing. Drive cross country with it, it's dispersed, and you're not going to be able to find a thing.

Nakashima: I think another concern we might have is the public, the community, when they see that nothing has been done about even trying to look at what may have gone on.

Robles: Are we going to bear all that cost?

Nakashima: Well that's a legal issue whether you go after others.

Buril: Well, let's back up and look at it from an even more fundamental issue that I think the public would be concerned with. Is this going to impact me? The answers with the soils and so forth, nobody knows. It's been thirty years, and we have no way of going out there and figuring if it's going to be a problem.

Bishop: I think you would go a long way if you show incidents in these letters were single events. But, by saying that this happened thirty years ago when it's an ongoing process issue is wrong.

Buril: You're right, and that's very easily addressed by just making sure that we identify these things as just one-time events. These are not part of decades of use. Then the second thing is, well what about the drinking water that has come out of the ground in this place. We've already got a monitoring well

network that can look for every one of these things that we're concerned with. And, water purveyors are required by law to analyze for these things before they supply the water to their customers. So from exposure standpoint to the public, they don't have a problem in the arroyo with the soils, and they don't have a problem because the groundwater is being monitored for them. They don't have a concern. That would be my premise to anyone from the public asking questions about this. You really don't have a concern. You've been protected from groundwater exposure, and being thirty years ago and one-time processes and so forth, you don't have a concern there either.

Robles: We are asking again. What do you want us to do? We need clear direction so we can tell you yes, maybe, or no. We absolutely don't know what you guys want. What do you guys want us to do? I haven't the foggiest idea.

And as I said before, if we don't find anything, what does that mean? And if we do find anything, what does that mean? That's the key question.

Swarthout: Penny may have some other issues, but mine, as I think I stated before, is that evidence of thirty years ago of one event brings to mind that was this a common practice with waste products from the Lab. And if it was not, then showing that goes a long way toward showing this is not an issue. If this aluminum oxide was discharged once a month at a thousand pounds for twenty years, you've got a different story to deal with.

Nakashima: These letters here are just what we know about. We have no idea what went on that we don't know about.

Buril: It was a one-time thing, and there was only one correspondence, and you have it. How are we to prove otherwise?

Nakashima: Wouldn't the records tell me that?

Buril: The records that we have would not identify that for us. There were no waste disposal requirements back in the Forties and Fifties. There is no way to exonerate ourselves.

Bishop: That's actually untrue. There were waste disposal requirements. I don't know exactly what year they started, but there were requirements.

Buril: Were there requirements for keeping records specifically that deal with aluminum oxide and things of that nature being disposed of?

Bishop: No, but that's not what you said.

Buril: I'm trying to keep it in the context of what it is we're dealing with here and how to best deal with helping us through this issue.

Bishop: All I'm saying is it concerned somebody, because they wrote a letter. We're not saying, you can't find anything so we're going to assume it happened until yesterday. But JPL has records. They know what they did to those materials.

Buril: I don't know if that's true, to be quite honest with you. That's part of my problem. Making the assumption that we want to do something, what do we do?

Robles: That's the question we're asking. We need guidance. Do we sample the whole Arroyo Seco, put a bunch of wells down, if we don't find anything, keep looking until we find something?

Nakashima: So, you are saying you have no records at all?

Buril: Not any further back than probably the late Seventies.

Robles: You see, we faced this because we had the Corps come in here because this used to be owned by the Army. And they're looking at how much money they're going to have to pay for Superfund because DoD has been directed by the Pentagon to determine their responsibility. The question they asked is, we want to look at all your records. And they did. They went to Laguna Niguel. We went through all of our archives here. We pulled out all the records from JPL Edwards facility, the bunkers we use for storing. We don't have a lot of data, to be honest with you. That's one of the problems, because what we have is contracts.

Up until 1960 when NASA took over, most of this was done just basically through task orders. They come in, they reverse engineer a V-2 rocket to find out about a propulsion unit. We have pictures, we know stuff was done. There is some memory, but actual records we don't have.

Buril: Also, there was an interesting thing I learned about that was going on internally as recently as the late Eighties. That was known as the paper purge. JPL generated such voluminous amounts of paper that they had nowhere to store it. And the storage costs and so forth were becoming outrageous. They would literally go through and purge their files and destroy things that they had no further need of. I think that if there were any records as Jon indicated, they were probably disposed of simply because they didn't need to worry about what they had disposed of back in the Forties now in the Seventies. There wasn't a requirement for them to worry about it.

Robles: We're trying right now to do interviews with people just so we can jog our memory. I mean the Corps is really irritated at us because we don't keep records like the military. Well, we're not a military base. JPL has never kept those kind of records. There was no need for it.

This is the problem. I don't believe we can prove one way or the other, so let's make the assumption that we've got to do something with the Arroyo Seco. We're still asking what you want us to do? If it's to sample the whole Arroyo Seco and sink multiport wells to find out any contaminant, what does that mean if we find it or we don't?

Bishop: In connection with this stuff, you said you were researching essentially the same kind of issue with the Corps, so are you putting together a report on past practices?

Robles: They're doing the report. Techlaw is a law firm that is hired by the Corps to do the research, and they're going to come in and say NASA, you did one-hundred percent of the contamination, and we're not paying a dime; or they're going to

say the Army is only responsible for fifty percent, here's X amount of dollars. That's what they're trying to find out.

Bishop: Somebody has already gone through and is looking for information on what has happened, both what the Corps did and what NASA did. That may be some good information.

Robles: That's going to be about another 18 months before they finish the report because they have to go through the interviews, scrub it, come back, if they don't like it they're going to have some more questions. We probably expect the report next January.

Buril: That's making the assumption that the Army will share the report with us. At this juncture, I don't think they are planning on it.

Bishop: There are ways to get the information from the Army. They may not be willing to share it with you, but I think they would be willing to share it with the EPA, the Department of Health Services, and so forth.

Buril: I can't say that's categorically true, but I wouldn't doubt you are right.

Robles: But that's where we're at right now. I think right now you guys need to go back and think about this. Tell us what you want, exactly what you want us to do because right now we can't give you an answer.

Robles: Any other comments on the Arroyo Seco? Okay, number 6.

6. Schedule for Next RPM Meeting

Buril: I'm going to put forth a thought here that perhaps the next meeting might be best served by having some response back from the agencies on this Arroyo Seco issue prior to that meeting. I don't know how long it would take the agencies to come to a consensus on what it is that they want to do. So I would suggest that the agencies give us some feedback. Is three months enough time for you to come to grips with this issue and provide us back information so we can talk about the next meeting?

Swarthout: I think that would be plenty of time.

Buril: So, it's just right in your view.

Swarthout: Yes.

Nakashima: Three months would be May.

Buril: I know that each of you has certain days that are good or bad in a given week.

Swarthout: For me, right now, it's just Mondays.

Buril: Jon, is there any one day that is better or worse for you? Are you the person, or would Gail be the person?

Bishop: We don't know at this point.

Buril: Let me throw out a suggestion of May tenth. That's a Wednesday. It's kind of in the middle of the week. It gives you a couple days ahead of it and a couple days behind to do things.

Robles: May 10th, same time, same station.

7. Status of Previous Meeting Action Items

- Input from Nakashima on vapor maps.

Buril: Penny, you were going to provide the input on soil vapor maps, and apparently that was something you were going to be waiting on.

Nakashima: I'm waiting for the data first. **Buril:** Okay, so we need to get that to you, so that can happen.

- Agencies get together and develop and compare their ARARS list.

Buril: In January that had not come together. Gail had sent me a copy of the ARARS for Regional Board, and we got yours Penny as well. Is there any other need for interaction that you folks need to have in order to establish what the ARARS should be for the site.

Swarthout: I don't think so. I think from EPA's point of view, based on the information we have from the data, and we know the type of contaminants we have, and we know where those contaminants are in general, we can start looking at what some of the ARARS are. So, I don't think there's any real need for us to get together and come up with a list.

- Agencies decision on whether one round of data for OU-3 will be sufficient.

Buril: I think we've closed that loop for OU-3, and we'll try to come up with a creative means of getting the second round somewhere in the process before the finalization of the ROD.

Swarthout: Maybe that could be an action item for the next meeting is to come up with a plan.

Nakashima: Schedule or a chain of events?

Buril: I think a chain of events that would lead to the schedule, but we need to agree on the chain of events before we develop the schedule.

Robles: I recommend, then, that we do something and fax it to them.

Swarthout: And like you said, if you want to have a conference call before the meeting, to discuss it, that's fine.

Buril: That might be of some benefit, so then we can know that our chain of events and approach is okay, and we can develop a schedule based on that. And, we can talk about it at the meeting.

- Who deals with the Arroyo Seco and who deals with the eco-tox evaluation.

Robles: Aside from the issue of once they tell us what they want from the Arroyo Seco, there's a second question. My concern is that it appears to us that the regulators want us to do an

eco-tox on the Hahamonga Project and its impact to Superfund. Our opinion is that it should be reversed. They're doing the water plan - they need to put in their document the impact of their project to our project. Our eco-tox will focus on the human risk and animal risk to the site and to those areas, like maybe Altadena.

Bishop: I think what you're confusing is if there is any toxicity problem associated to the park from JPL. If JPL discharges put something in there that when they open this project now there's going to be exposure. That's the issue. It's not an issue of, well, outside of our boundary so we don't have to look at it.

Buril: Well, let's see if I can draw the distinction that I think I heard. If indeed, we come to some consensus that JPL has impacted the arroyo. Then we are in the position of having to determine what that impact is by having to do the eco-tox evaluation because of that impact.

Bishop: I think, the issue is regardless of where the contamination is coming from, be it on base or the arroyo or impacts the arroyo, if there is contamination from JPL that is going into any body of water be it on or off base, and there is some impact to the ecology in the area, JPL would be required to clean that up.

Buril: That's making the assumption it would be a current discharge impacting a current body of water or a future body of water.

Swarthout: I'm a little confused. I'm not a hundred percent sure how it works if, for example, if somebody puts in a lake. But, you may still be responsible.

Robles: My concern is that we're going to do an eco-tox for the whole Hahamonga Project. That's what I'm hearing, and that's where I'm having a problem.

Bishop: No, I don't think you have to do an impact for the whole project, but you have to do an ecological risk assessment that determines if the contamination from JPL is affecting the ecology be it on or off the base. So there's a lake there, and they're going to call it Hahamonga Park. That's kind of irrelevant. The point is, is there contamination coming from JPL that is affecting that lake and is affecting the ducks that live in the lake.

Buril: Okay.

Robles: Present contamination?

Bishop: No, that's where the problem is because if they dig up for this lake and suddenly the lake is full of chromium and the ducks are all dying. Whose problem is that? That is JPL's problem because we know you discharged chromium out in this site in the arroyo for a long period of time. We might argue that later, but that's the kind of thing that we were talking about.

Robles: Well, this is where the problem is then. We assume then that all the chrome in the Arroyo Seco is ours.

Bishop: We know that you discharged chrome. We have it, and we know that it went on for a certain period of time. If you

have some other evidence that we don't have, then we may be able to say it isn't all yours. But right now, this is what we have.

Robles: Now the question is, are we then cleaning up for the Hahamonga Project?

Bishop: No, you're cleaning up your chrome, that happens to be exposed because of the Hahamonga Project. It is not their responsibility to mitigate their land use to fit your exposure.

Buril: I can see that point. If we made it dirty, we've got to clean it up. That's what they're saying. But, let's take the other side of that coin for just a moment. If we can't identify an impact to the Hahamonga Project at all as a result of JPL discharges, are we obligated to perform an eco-tox assessment of the project regardless.

Swarthout: You don't have to perform an eco-tox for the Hahamonga Project.

Robles: That's the clarification we want.

Swarthout: Is there a lake down there now?

Robles: There was for a few days from the runoff.

Swarthout: Are they building a lake there now?

Robles: It's going to be ten years before they finish this whole project, but the lake is built. They've been digging out dirt. If the issue is what is JPL's impact to the Arroyo Seco and any future project there, I could buy that. That's our responsibility, and we should look at that. My concern is what we're getting into is that we're doing an eco-tox for the whole Hahamonga Project when they should be doing an assessment.

Buril: Well, let me explain the reason why this concerns me. In Laura's [DTSC Eco-Tox expert] recommendation, her recommendations regarding our approach to the eco-tox was that things such as wildlife migration corridors and other things that are impacted by the completion of the Hahamonga Park need to be evaluated in our assessment. And our point is, that's an EIR consideration for the people developing the park.

Bishop: I still have a disagreement with that. Maybe I'm wrong because I didn't read that, but are they talking about a corridor through your plant or through your area?

Buril: Through our plant, that's one thing, but if it's down the arroyo that's another.

Nakashima: Maybe there was a misunderstanding. I think what she was saying was that you have to evaluate the critters that would come down through this corridor, which could be off-site, and that go down into this impacted area, to feed or drink the water or whatever. That's all she is saying.

Buril: Well, there are a number of tacit assumptions made there that I guess we need to understand.

Nakashima: She's saying if there is an impact from contaminants from JPL in this area, that's when you have to do the animals coming through.

Buril: Well, there's tacit assumptions there that: 1) it assumes that JPL has negatively impacted the arroyo; and 2) wildlife will migrate to that area and be impacted as well.

Nakashima: It creates a new corridor for these contaminants because here now you have a lot of animals.

Robles: I wouldn't mind doing an eco-tox with the animals that come through JPL to go down to the park, but I have a problem doing an eco-tox for animals that are just coming straight down from the mountains, bypassing JPL, to go down to the new water park.

Buril: Now, you're making the assumption that there's nothing that we have created down there to create an impact.

Robles: Right. See, the eco-tox I'm looking at: An animal comes on our facility, we've got to look at it.

Swarthout: I think the point isn't the animal coming onto your facility. The question is are animals being exposed to contamination that comes from JPL? They may come across your facility or not and still be impacted by contaminants.

Buril: So then the key question is where is our contamination? Have we impacted? So the ultimate question that we've got to find out is the impact that we've done to the Arroyo Seco, if any. Penny, I think that was the point of your letter to Brian to try to determine that. And I guess it comes back to the same question that I guess we've had all along. What do you want us to do with that? We can't put a bound on it. We don't know how to approach this.

Swarthout: Yes, the point with both the human health and the ecological risk assessment is you have a source, a pathway, and a receptor. It doesn't matter whether it's on or off the base. Those are the three components that you have to look at. I mean, as animals come down the arroyo and there happens to be contamination from JPL in the arroyo, just because they didn't cross JPL property, you would still be responsible for mitigating that.

Robles: I think this would be a moot point if it wasn't for that water coming through there and everything being washed out. That's the hardest thing. I've sat around over the weekend trying to think about it. How do we find what we've done? And, if we take samples, and we find negative, what does that mean. If we take samples and find positive, now what does it mean? I always look at the end. Once you take a sample, what does it mean? What do we do from there? And that's the key question. Otherwise, if it's going to give us an answer that we can then go to another action, then I'm for it; let's take the action, let's take the sample. Data is just data. It's got to be used for something.

Bishop: I agree with you. You don't take samples unless you have an idea of what you're going to do with them. I just do have some concerns. In a lot of instances, one recording of a problem is the only thing that we're going to find in any of our records. That doesn't mean that there's not anything in the records of JPL.

- Swarthout will send a copy of the ROD for George Air Force Base.

Buril: I have received the copy, so we can consider that closed.

8. Other Topics - Action Items

- a. For OU-1, Swarthout suggested additional sampling of some screens at some wells for volatiles. We need to discuss that with NASA and Foster-Wheeler.
- b. NASA/JPL is going to meet with Foster-Wheeler to discuss the chain of events and approach for OU-3. The goal is getting in the two sampling rounds without throwing off the schedule for ROD. We'll set up a telecon with the agencies to discuss that.
- c. Swarthout is going to go back and speak to Dan Stralka about the exposure assessment and get back to NASA/JPL.
- d. The agencies will get together and come up with a proposal for what they want NASA/JPL to do regarding the Arroyo Seco issue, so that we can respond to that.
- e. The next meeting is set for 10:00 a.m. on Wednesday, May 10, at JPL.
- f. Nakashima will get back to JPL on soil vapor data, but she needs the upcoming data to do that.

Niou: One question, when will we see some of the water sampling data or soil sampling data?

Buril: As soon as we have the summation of our validation effort completed. It will probably be in the next couple, three weeks.

Melchior: Soil vapor will probably be 4 to 6 weeks.

Buril: We did the verification with chromatographs before, which is not nearly as intensive, so I'll say approximately the same time frame.

Swarthout: I was wondering about the schedule. Is there some question about the schedule.

Buril: On OU-3, definitely.

Swarthout: The next thing is the draft RI for each of the operable units. It seems like there's something open now.

Buril: As it stands right now, the OU-1 RI is due, I believe it's the end of May.

Swarthout: May 31st.

Buril: And that the OU-2 RI is due the end of September.

Swarthout: I have October 5th.

Buril: That's about right. Now, OU-3 is a wide-open question because of the timing of the second round of data and so forth. Now, depending upon how well we can get data back from the laboratories and such for OU-1, we may have a minor impact

there. That date may slip a little, but we don't know that yet, so I don't want to raise that as an issue at this point.

Swarthout: So, the only one is OU-3, and you'll have some idea about that next time?

Buril: We're trying to figure that one out, but again, just as a heads up, there is a potential impact with OU-1 because data is coming back slowly from the lab. It's just not a major issue.

Is there anything else, anything else from the agencies that you want to put on the table? Anything on our side?

Nakashima: I have to say one more thing. Can you send out a notification letter of when you're planning to do the field work?

Buril: Yes.

Nakashima: I didn't get one for the soil vapor and groundwater.

Novelly: We did phone calls on those, but we will do written notices.

Buril: All right, thank-you all.

ACRONYMS AND TERMS USED

ARAR	Applicable or Relevant and Appropriate Requirement
ATI	Analytical Technologies Inc.
DCA	1,1-dichloroethane
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DCE	1,1-dichloroethene
EIR	Environmental Impact Report
ESI	Expanded Site Inspection
FS	Feasibility Study
MW	Monitoring Well
OU	Operational Unit OU-1 Onsite ground water OU-2 Onsite soil OU-3 Offsite ground water
MCL	Maximum Contaminant Level
PCE	Tetrachloroethene (also called perchlorethene or PERC)
PERC	see PCE
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Managers' (meeting)
TBC	To Be Considered
TCE	Trichloroethene

EXPLANATION

- Existing Shallow Monitoring Wells
 - Wells MW-1 and MW-2 Installed by Geotechnical Consultants, Inc. in 1982
 - Wells MW-5, MW-6, and MW-7 Installed by Ebasco in 1990
 - Wells MW-8, MW-9, and MW-10 Installed by Ebasco in 1992
 - Well MH-01 Installed for City of Pasadena in 1982

- ▲ Existing Deep Multi-Port Monitoring Wells
 - Wells MW-3 and MW-4 Installed by Ebasco in 1990
 - Well MW-11 Installed by Ebasco in 1992

- Proposed Shallow Monitoring Well

- ▲ Proposed Deep Multi-Port Monitoring Well

- 37 Seepage Pit or Dry Well Location (See Work Plan)

- Suspected Waste Disposal Area (See Work Plan)

- Trace of JPL Thrust Fault (Agabian Associated, 1977)

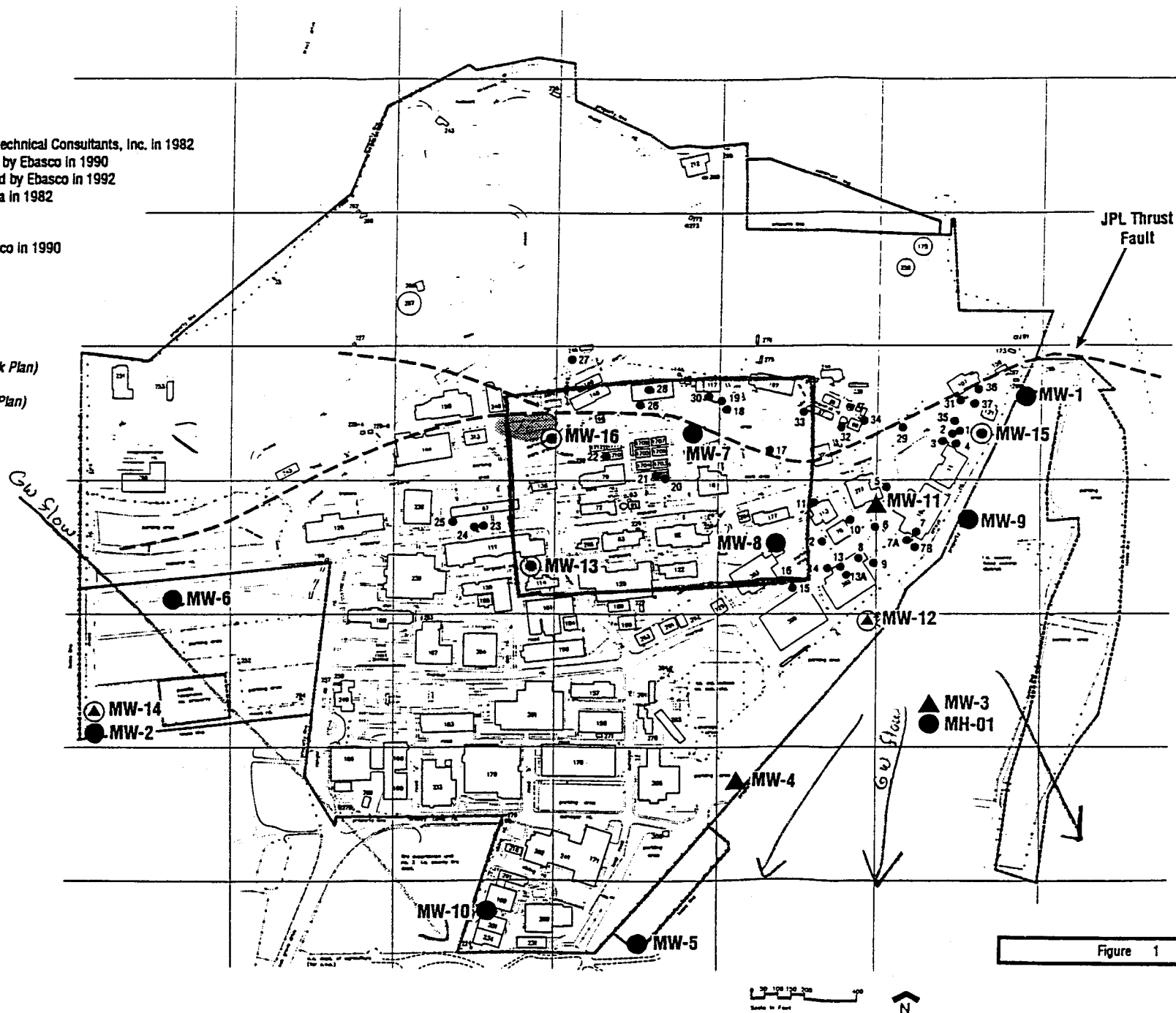


Figure 1